

FDR8521L

P-Channel MOSFET With Gate Driver For Load Switch Application

General Description

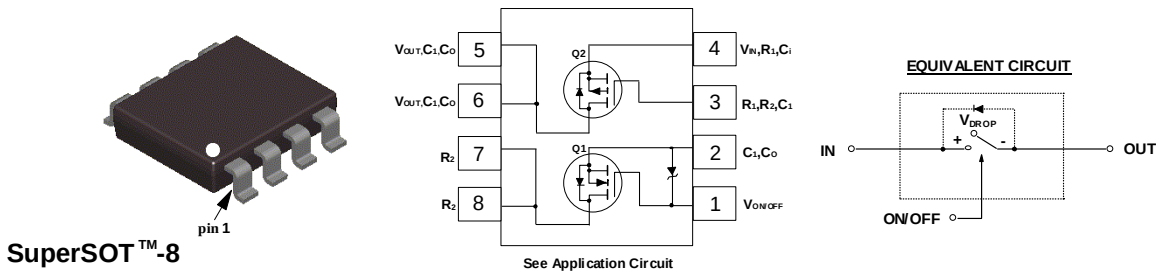
This device is designed for configuration as a load switch and is particularly suited for power management in portable battery powered electronic equipment. Designed to operate from 3V to 20V input and supply up to 2.9A, the device features a small N-Channel MOSFET (Q1) together with a large P-Channel Power MOSFET (Q2) in a single SO-8 package.

Applications

- Power management
- Load switch

Features

- $V_{\text{DROP}} = 0.07 \text{ V @ } V_{\text{IN}} = 12 \text{ V, } I_{\text{L}} = 1 \text{ A. } R_{\text{(ON)}} = 0.07 \Omega$
 $V_{\text{DROP}} = 0.115 \text{ V @ } V_{\text{IN}} = 5 \text{ V, } I_{\text{L}} = 1 \text{ A. } R_{\text{(ON)}} = 0.115 \Omega.$
- $V_{\text{DROP}} = 0.2 \text{ V @ } V_{\text{IN}} = 12 \text{ V, } I_{\text{L}} = 2.9 \text{ A. } R_{\text{(ON)}} = 0.07 \Omega$
 $V_{\text{DROP}} = 0.2 \text{ V @ } V_{\text{IN}} = 5 \text{ V, } I_{\text{L}} = 1.8 \text{ A. } R_{\text{(ON)}} = 0.115 \Omega.$
- Control MOSFET (Q1) includes Zener protection for ESD ruggedness (>6kV Human Body Model).
- High density cell design for extremely low on-resistance.



Absolute Maximum Ratings

T_A=25°C unless otherwise noted

Symbol	Parameter	Ratings	Units
V _{IN}	Input Voltage Range (Note 1)	3 - 20	V
V _{ON/OFF}	On/Off Voltage Range	2.5 - 8	V
I _D	Load Current - Continuous (Note 2)	2.9	A
		8	
P _D	Maximum Power Dissipation (Note 2)	0.8	W
T _J , T _{stg}	Operating and Storage Temperature Range	-55 to +150	°C
ESD	Electrostatic Discharge Rating MIL-STD-883D Human-Body-Model (100pf/1500 Ohm)	6	kV

Thermal Characteristics

R _{θJA}	Thermal Resistance, Junction-to-Ambient (Note 2)	156	°C/W
R _{θJC}	Thermal Resistance, Junction-to-Case (Note 2)	40	°C/W

Package Marking and Ordering Information

Device Marking	Device	Reel Size	Tape width	Quantity
8521L	FDR8521L	13"	12mm	3000 units

Electrical Characteristics

T_A=25°C unless otherwise noted

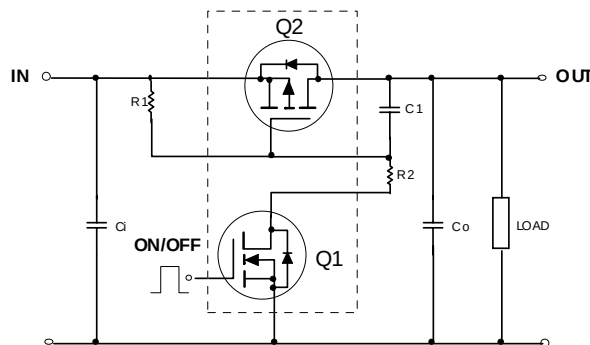
Symbol	Parameter	Test Conditions	Min	Typ	Max	Units
OFF Characteristics						
I _{FL}	Forward Leakage Current	V _{IN} = 20 V, V _{ON/OFF} = 250 μA			1	μA
ON Characteristics (Note 3)						
V _{DROP}	Conduction Voltage	V _{IN} = 12 V, V _{ON/OFF} = 3.3 V, I _L = 1 A V _{IN} = 5 V, V _{ON/OFF} = 3.3 V, I _L = 1 A V _{IN} = 12 V, V _{ON/OFF} = 3.3 V, I _L = 2.9 A V _{IN} = 5 V, V _{ON/OFF} = 3.3 V, I _L = 1.8 A		0.053 0.085	0.070 0.115 0.200 0.200	V
R _(ON)	Q ₂ - Static On-Resistance	V _{GS} = -12 V, I _D = 2.9 A V _{GS} = -5 V, I _D = 1.8 A		0.054 0.090	0.070 0.115	Ω
I _L	Load Current	V _{DROP} = 0.2 V, V _{IN} = 12 V, V _{ON/OFF} = 3.3 V V _{DROP} = 0.2 V, V _{IN} = 5 V, V _{ON/OFF} = 3.3 V	2.9 1.8			A

Notes:

1. Range of V_{IN} can be up to 25V, but R₁ and R₂ must be scaled such that V_{GS} of Q2 does not exceed -20V.
2. R_{θJA} is the sum of the junction-to-case and case-to-ambient thermal resistance where the case thermal reference is defined as the solder mounting surface of the drain pins. R_{θJC} is guaranteed by design while R_{θJA} is determined by the user's board design.
3. Pulse Test: Pulse Width < 300μs, Duty Cycle < 2.0%.

FDR8521L Load Switch Application

APPLICATION CIRCUIT



External Component Recommendation:

- For applications where C₀ ≤ 1μF.
- For slew rate control, select R₂ in the range of 470 - 10kΩ.
- For additional in-rush current control, C₁ ≤ 1000pF can be added.
- Select R₁ so that the R₁/R₂ ratio ranges from 10 - 100. R₁ is required to turn Q₂ off.

Typical Characteristics (continued)

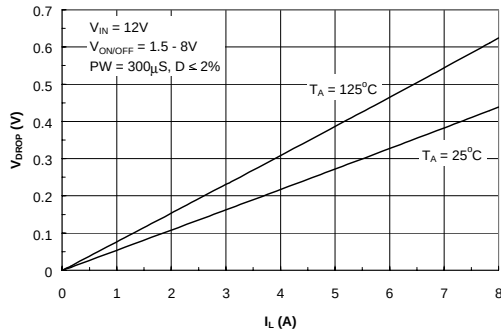


Figure 1. Conduction Voltage Drop Variation with Load Current.

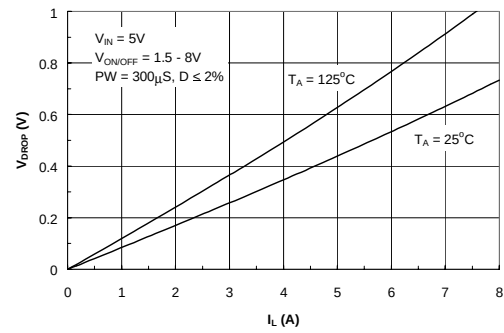


Figure 2. Conduction Voltage Drop Variation with Load Current.

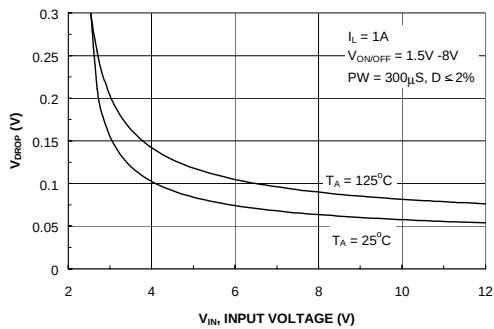


Figure 3. On-Resistance Variation with Input Voltage.

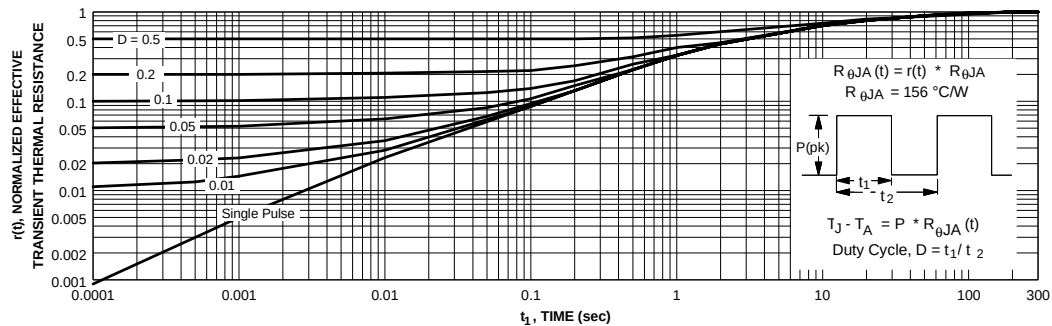


Figure 4. Transient Thermal Response Curve.

Thermal characterization performed using the conditions described in Note 2.
Transient thermal response will change depending on the circuit board design.

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